

Exhibit F

Prolonged TASER® "Drive Stun" Exposure in Humans Does Not Cause Worrisome Biomarker Changes

Jeffery D. Ho, MD¹, Donald M. Dawes, MD², Anne L. Lapline, MD³, William G. Heegaard, MD³, Laura L. Bultman, MD³, Mark A. Johnson, BS³, James R. Miner, MD¹

¹Dept. of Emergency Medicine, University of Minnesota Medical School & Hennepin County Medical Center, Minneapolis, Minnesota
²Dept. of Emergency Medicine, Lompoc District Hospital, Lompoc, California
³TASER International, Inc., Division of Research, Scottsdale, Arizona

INTRODUCTION:

The TASER® electronic control device (ECD) is used to control violent/agitated behavior in two ways. The primary method is probe deployment. The secondary method is the "Drive Stun" (DS) which produces a painful stimulus. This project is the first to study the human effects of the DS.

ECDs are scrutinized since individuals occasionally die unexpectedly following their use. Some deaths have occurred after a DS. There are cases of custodial sudden deaths when no ECD has been used, but a causal relationship is hypothesized.



METHODS:

Volunteers underwent a 24 hour monitoring process. After informed consent, a health history and baseline bloodwork was obtained. Subjects then received either a 15-second or two consecutive 5 second DS applications. Applications were to the neck/shoulder region using a TASER X-26 ECD.

Bloodwork was obtained after exposure and again at 8 and 24 hours after exposure. Samples were analyzed for: BUN/Creatinine ratio, Potassium, CK-MB, Lactate, and Troponin I.



DISCUSSION:

Recent animal studies have raised the question of whether CEW application can capture underlying heart rates or induce arrhythmias.^{3,4} The limitations of these animal model studies are significant and include size limits, probe placement limits, use of deep sedation/anesthesia and other factors that may make their methodology unrealistic.

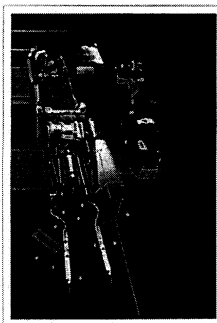
Our use of adult humans in an exhausted state is believed to be a better model in which to study this question.

RESULTS:

21 subjects enrolled (98.5% male, mean age 40.3 years + 6.8, range 29 to 55, mean body mass index 28.4 + 3.5, range 21.1 to 36.8). 11 had the single continuous exposure and 10 had the 2 shorter exposures.

Repeated measure ANOVA showed no significant change from baseline at the four time points or between exposure types for BUN/Creatinine ratio (mean value 14.8 + 3.7, range 6.6 to 23, p=0.40), serum potassium (mean value 4.0 mEq/L + 0.4, range 3.0 to 5.1, p=0.26), or serum CK-MB (mean baseline value 2.45 ng/mL + 2.89, range 0 to 20.9, p=0.32).

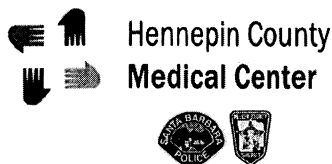
A significant decrease in serum lactate occurred from baseline at the 8 hour time point (p=0.005, baseline mean 1.87 mmol/L 95% CI 1.39 to 2.35, immediate post exposure mean 1.35 mmol/L 95% CI 1.04 to 1.65, 8 hour mean 1.06 mmol/L 95% CI 0.92 to 1.2, 24 hour 1.22 mmol/L 95% CI 1.1 to 1.4). All troponins were <0.2 mcg/L.



CONCLUSIONS:

There were no worrisome changes in the measured serum biomarkers. There was a significant decrease in serum lactate after exposure.

This data does not support a causal relationship between ECD DS exposure and worsening physiology.



Cardiac and Diaphragm ECHO Evaluation During TASER Device Drive Stun

Jeffrey Ho, MD^{1,2} • Donald Dawes, MD^{3,4} • Robert Reardon, MD¹
Ronald Moscati, MD⁵ • Rebecca Gardner, BS¹ • James Miner, MD¹

¹Department of Emergency Medicine, Hennepin County Medical Center, Minneapolis, Minnesota, USA

²Meeker County Sheriff's Office, Litchfield, Minnesota, USA

³Lompoc Valley Medical Center, Lompoc, California, USA

⁴Santa Barbara Police Department, Santa Barbara, California, USA

⁵Department of Emergency Medicine, SUNY at Buffalo, Buffalo, New York, USA

Introduction

The TASER Electronic Control Device (ECD) is currently available for law enforcement and civilian use. ECDs are used on subjects to control or repel violent / agitated behavior in two ways. The primary method is deployed probes. Human research, to date, has primarily examined this method. The second method is the Drive Stun (DS) comprised of direct contact with the front ECD electrodes. ECD research to date has primarily been done utilizing deployed probe based methodology. There has been limited information reported on the DS application, which is used in this study.

The DS method of application is known to cause a painful stimulus but, unlike the deployed probes, it is not believed to cause regional muscle incapacitation. ECDs have been the subject of scrutiny since individuals occasionally die unexpectedly sometime after DS exposures. Criticism of the DS has occurred and a causal relationship has been hypothesized through cardiac or respiratory compromise. This project examines this possibility.



Methods

Volunteers underwent informed consent at an ECD instructional course. Our volunteer population was made up of either law enforcement officers or physicians. The subjects had 10-second DS applications delivered as 2 5-second pulses with a 1 second rest between pulses. Applications were to the trapezius and lower extremity using a factory standard TASER X26 ECD.

Subjects had either limited cardiac or right-hemidiaphragm ultrasonography performed. Cardiac images were analyzed using M-mode through the anterior leaflet of the mitral valve for evidence of arrhythmia. Diaphragm images were analyzed using an intercostal oblique view, using the liver as a sonographic window. Images were interpreted by a skilled emergency physician, for heart rate, presence of sinus rhythm, or diaphragm respiratory movement. All images were obtained using a SonoSite Micoromaxx with a P17/5-1 MHz probe (SonoSite, Inc., Bothell, WA). Data were analyzed using descriptive statistics.

Discussion

In the United States, TASER ECDs are often used by law enforcement agencies to control or subdue people. There have been arrest-related deaths reported in situations where an ECD has been used at some point during the arrest process. Although these types of deaths also occur when ECDs are not present, they have been scrutinized as potential contributory factors.^{1,2}

To date, human research examining modern-day ECDs has not found a contributory connection.^{3,4,5,6} However, most of this research has utilized the theory of deployed probe methodology. Deployed probe methodology should theoretically yield results that are applicable to a worst-case scenario due to the greater separation distance of the electrical current contact points. While no connection has been found, there have been claims of injury or death based on DS ECD application methods.⁷

This work represents initial investigatory human research to examine the possibility of a connection between DS ECD application and worsening, measurable human physiology.

Results

21 subjects were enrolled, 10 had cardiac and 11 had diaphragm views. For the subjects with cardiac views, the pre-exposure mean heart rate was 95.2 ± 14.8 , range 82 to 114. The mean heart rate during the first pulse of the ECD exposure was 139.0 ± 14.7 , range 111 to 150. The mean heart rate during the last pulse of the exposure was 131.6 ± 16.7 , range 106 to 156.

All cardiac views were confirmed to be normal sinus rhythm throughout the monitoring period. The mean heart rate one minute after exposure was 93.1 ± 19.5 , range 55 to 118. The diaphragm was noted to move consistent with respirations during all ECD pulses in all subjects with diaphragmatic views.

Conclusions

Drive Stun exposure did not cause abnormal rhythms or apnea in this small sample of ECD exposed subjects. There was an increase in heart rate that resolved within one minute of the exposure.

We did not find a connection between measurable, worsening human physiology and ECD DS exposure. This work is consistent with previously reported findings of human ECD studies utilizing deployed probe methodology.

References

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- ⁶Levine JD, et al. Cardiac monitoring of human subjects exposed to the TASER. *Am J Emerg Med*. 2007; 33:113-117
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TASER® Wound Progression in Two Deployment Modes

Jeffrey D. Ho, MD^{1,3} • Donald M. Dawes, MD^{2,4} • James R. Miner, MD¹

¹Dept. of Emergency Medicine, Hennepin County Medical Center, Minneapolis, MN

²Dept. of Emergency Medicine, Lompoc Valley Medical Center, Lompoc, CA

³Meeker County Sheriff's Office, Meeker County, MN

⁴Santa Barbara Police Department, Santa Barbara, CA

Introduction

Electronic Control Devices (ECDs) are used by law enforcement to control or repel violent subjects. The TASER® X26™ is the most commonly used ECD by law enforcement. It can be used in two ways: The first is the probe-deployment mode when probes are discharged from the ECD at the subject. The second is the direct contact method known as the "Drive Stun" deployment mode. The two different deployment modes can create different wound marking patterns.

There is sometimes confusion in recognizing the markings left on the skin by an ECD. This may be due to unfamiliarity with the device or its method of application, and lack of literature demonstrating examples of ECD marking patterns. Especially since they can change in appearance over time.

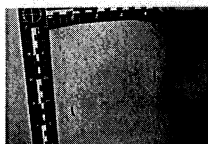
It is important for healthcare providers and forensic specialists to be familiar with the appearance of these marks because they are often the prime sources of documentation after an ECD application has occurred. Failure to recognize the characteristics of the ECD marks can lead to erroneous opinions and false conclusions.

Objective

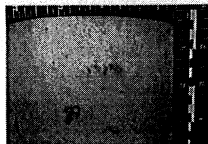
Our objective is to present visual information about the skin markings that result from two modes of ECD application to educate the viewer of the different "signature" skin markings that can result from an ECD application.

Methods

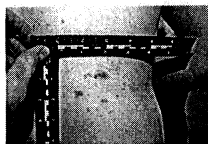
- IRB approval was obtained prior to beginning this study.
- Volunteer subjects are recruited from police training classes.
- All volunteers give informed consent prior to enrolling in this study.
- The volunteer subjects are to receive an exposure from a TASER X26 ECD as part of their training class.
- Subjects randomize themselves by choosing to receive one of two deployment modes:
 - Probe deployment to the back at approximately seven-feet from the ECD operator.
 - Drive Stun to the upper arm.
- Each exposure is for five continuous seconds.
- Volunteers complete a screening questionnaire that included the Fitzpatrick Classification scale for skin type scoring.
- Volunteers have photographs of the application area taken immediately after exposure, at 24, 48, and 72 hours after exposure, and finally at 30 days after exposure.



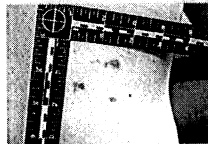
Immediately After Exposure



24 Hours After Exposure



48 Hours After Exposure



72 Hours After Exposure

Discussion

- Failure to understand the application modes of current ECDs can lead to erroneous opinions and false conclusions.
- Erroneous opinions have supported frivolous litigation in this area.
- While skin type, area of application, duration of application, time since application and other factors may affect the visual appearance of ECD application marks. There are some consistencies that remain.
- Forensic specialists and healthcare providers need to familiarize themselves with these consistencies.

Results

Each mode of application leaves a distinctly different "signature" type of marking.

Probe Deployment:

- Generally create circular superficial partial thickness burns.
- Consistent across all volunteers
- Mark separation distance is dependent on the distance the probes were deployed from.

Drive Stun:

- Creates variable marks depending on the movement of the subject.
- This includes irregular and superficial wounds that are usually paired at 40mm.
- 40mm is the distance between the metal contact points on the device.
- This mode also creates abrasions and contusions presumably from subject movement.
- Some volunteers have non-paired marks presumably from loss of contact during movement.

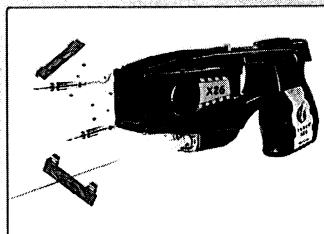
Some volunteers have persistent hyper-pigmented marks at one month. There have been no complications reported.

Conclusions

- TASER X26 ECD skin markings have consistent characteristics when applications are made in the probe deployment mode.
- The Drive Stun mode of application yields less consistent markings but may show supporting patterns in the form of consistently paired spacing of the marks.
- This information is important for forensic examiners to be familiar with so that they can distinguish these marks from other forms of trauma, naturally occurring lesions, or self-induced injuries.

Limitations

- Our current data does not represent every skin type in the population.
- Our study has not accounted for every possible application scenario.



Conflict of Interest Disclosure

1. Drs. Ho and Dawes serve as external research consultants to TASER International, Inc.
2. Dr. Miner has no conflicts to declare and serves as the principle oversight investigator and statistician for the project and is responsible for the integrity of the data.